

“The Exact Histological Localisation of the Visual Area of the Human Cerebral Cortex.” By JOSEPH SHAW BOLTON, B.Sc., M.D., B.S. (Lond.). Communicated by Dr. MOTT, F.R.S. Received May 11,—Read June 14, 1900.

(Abstract.)

*Previous Research.*

The previous research concerning the human visual area has been carried out in three directions.

- (1) The study of lesions causing blindness.
- (2) The study of the myelination of the corona radiata.
- (3) The histological examination of “occipital” or “calcarine” cortex as regards—

- (a) Cell form.
- (b) Subdivision of this variety of cortex into layers.
- (c) The modifications caused in (a) and (b) by long-standing blindness.

Examination of the literature on the first two subdivisions demonstrates the extreme diversity of opinion which exists regarding the situation of the primary visual area of the cortex.

The object of the present research has been to indicate the exact region of the cortex to which the visuo-sensory function is limited. For this purpose it has been unnecessary to pay attention to the special neuronie structure of this portion of the cerebrum, but the general histology of the cortex referred to in (3), (b), and (c) has been considered minutely in the third section of this paper.

*The Exact Distribution of the “Occipital” Lamination.*

(1) The “occipital” lamination in the region of the calcarine fissure has been histologically mapped out, in six normal and pathological brains, as a well defined cortical area.

(2) The general distribution of this area is as follows. It occupies—

- (a) The body of the calcarine fissure, including the anterior and posterior annectants, and extending upwards to the parallel cuneal sulcus and downwards to the collateral fissure.
- (b) The posterior part of the calcarine fissure extending to the polar sulci surrounding its extremities.
- (c) The inferior lip of the stem of the calcarine fissure (including the superficial surface and lower lip of the cuneal annectant) nearly to its anterior extremity, just posterior to which the area tails off to a sharp point.

(3) The approximate outline of this area is consequently pear shaped with the apex anteriorly and the thick end at the pole of the hemisphere.

(4) The area is much decreased in extent, but not in distribution, in cases of old-standing optic atrophy.

(5) In anophthalmos the area is much contracted as regards both extent and distribution. It occupies the usual position in the stem of the calcarine fissure, but only extends backwards as far as the posterior cuneo-lingual annectant, and it is confined to a portion of the inferior lip of the fissure and to the cortex between this and the collateral sulcus.

*The General Histology of the Cortex Cerebri in the Region of the Calcarine Fissure.*

(1) The following classification of layers has been adopted for the purposes of micrometer measurements:—

(a) The cortex of the area of special lamination which has just been described.

- I. The superficial layer of nerve fibres.
- II. The layer of small pyramidal cells.
- IIIa. The outer granule layer.
- IIIb. The middle layer of nerve fibres, or line of Gennari.
- IIIc. The inner granule layer.
- IV. The inner layer of nerve fibres.
- V. The layer of polymorphic cells.

(b) The cortex surrounding the area of special lamination.

- I. The superficial layer of nerve fibres.
- II. The layer of small and large pyramids.
- III. The layer of granules.
- IV. The inner layer of nerve fibres.
- V. The layer of polymorphic cells.

At the junction of these two varieties of lamination an abrupt change takes place, the line of Gennari suddenly ceasing, and the outer granule layer joining the inner one, the conjoined layer being approximately of the thickness of the former outer layer.

(2) The average of very numerous micrometer measurements of the cortex of the area of special lamination and of the neighbouring convolutions gives the following results:—

(a) In the area referred to, in cases of old-standing optic atrophy, the line of Gennari is decreased nearly 50 per cent. in thickness, and the outer granule layer more than 10 per cent.

- (b) On the other hand, in the cortex surrounding the area referred to, old-standing optic atrophy causes no modification of the lamination.
- (c) In anophthalmos the conjoined outer granule layer and line of Gennari (for the granules in the former layer are not sufficiently obvious to admit of easy micrometer measurement alone) are narrowed down to two-thirds of the normal thickness, the other layers of the cortex being approximately unchanged. This amount of narrowing is the same as that found in cases of old-standing optic atrophy.
- (d) The majority of the layers of the cortex either inside or outside the area of special lamination do not vary appreciably in thickness as a result of age or chronic insanity, but there is an almost exact correspondence between the thickness of the conjoined first and second layers of the cortex and the degree of amentia or dementia existing in the patient.

*Summary of Conclusions drawn from the present Research.*

- (1) The area located and described in this paper is the primary visual region of the cortex cerebri.
- (2) The part of this area to which afferent visual impressions primarily pass is the region of the line of Gennari.
- (3) A marked contraction of the area in both extent and distribution, without absence of the line of Gennari, occurs in anophthalmos.
- (4) This area can probably be described as the cortical projection of the corresponding halves of both retinae. In this projection the part above the calcarine fissure represents the upper corresponding quadrants and the part below the lower corresponding quadrants of both retinae.

“Underground Temperature at Oxford in the Year 1899, as determined by Five Platinum Resistance Thermometers.” By ARTHUR A. RAMBAUT, M.A., D.Sc., Radcliffe Observer. Communicated by E. H. GRIFFITHS, F.R.S. Received May 17,—Read June 21, 1900.

(Abstract.)

*I. Description of the Apparatus.*

The instruments with which the earth-temperatures given in this paper were observed were five platinum resistance thermometers of the Callendar and Griffiths pattern.

The thermometers were inserted in undisturbed gravel, the first four